CPSC 449: Assignment 1

Fall 2014 (Revised September 22, 2014)

Due: Monday, September 29, 2014, at 12:00 PM noon

Each of the questions below is worth 20% of the total grade.

1. (a) **[Thompson]** exercise 3.14. Name the two functions **`myMin`** and **`myMinThree`**. **Hint:** Don't do anything too fancy, or else you will suffer in part (b).

   (b) Based on your implementations for part (a), evaluate the following two expressions using equational reasoning:

   ```
   myMin (2-1) (1-2)
   myMinThree (3+3) (2+2) (1+1)
   ```

   Use Haskell's order of evaluation (i.e., don't evaluate something until it is absolutely necessary).

2. Implement a function **`gcd`** that takes two **`Integer`**s as arguments, and returns the greatest common divisor of the arguments using the ***Euclid's Algorithm***.

   ```
   gcd :: Integer -> Integer -> Integer
   ```

   You may safely assume that the arguments are both positive. **Hint:** If applicable, show off you know how to introduce local definitions.

3. **[Thompson]** exercise 5.21. **Hint:** Use list comprehension.

4. **[Thompson]** exercise 5.32. Contrary to the statement of the exercise in the textbook (which asks only for a "discussion"), you are required to provide the Haskell implementation of all the database functions, namely:

   ```
   books       :: Database -> Person -> [Book]
   borrowers   :: Database -> Book -> [Person]
   borrowed    :: Database -> Book -> Bool
   numBorrowed :: Database -> Person -> Int
   makeLoan    :: Database -> Person -> Book -> Database
   returnLoan  :: Database -> Person -> Book -> Database
   ```

5. **[Thompson]** exercise 6.10.

   Hint: You need the following type declaration:

   ```
   type Picture = [[Char]]
   ```